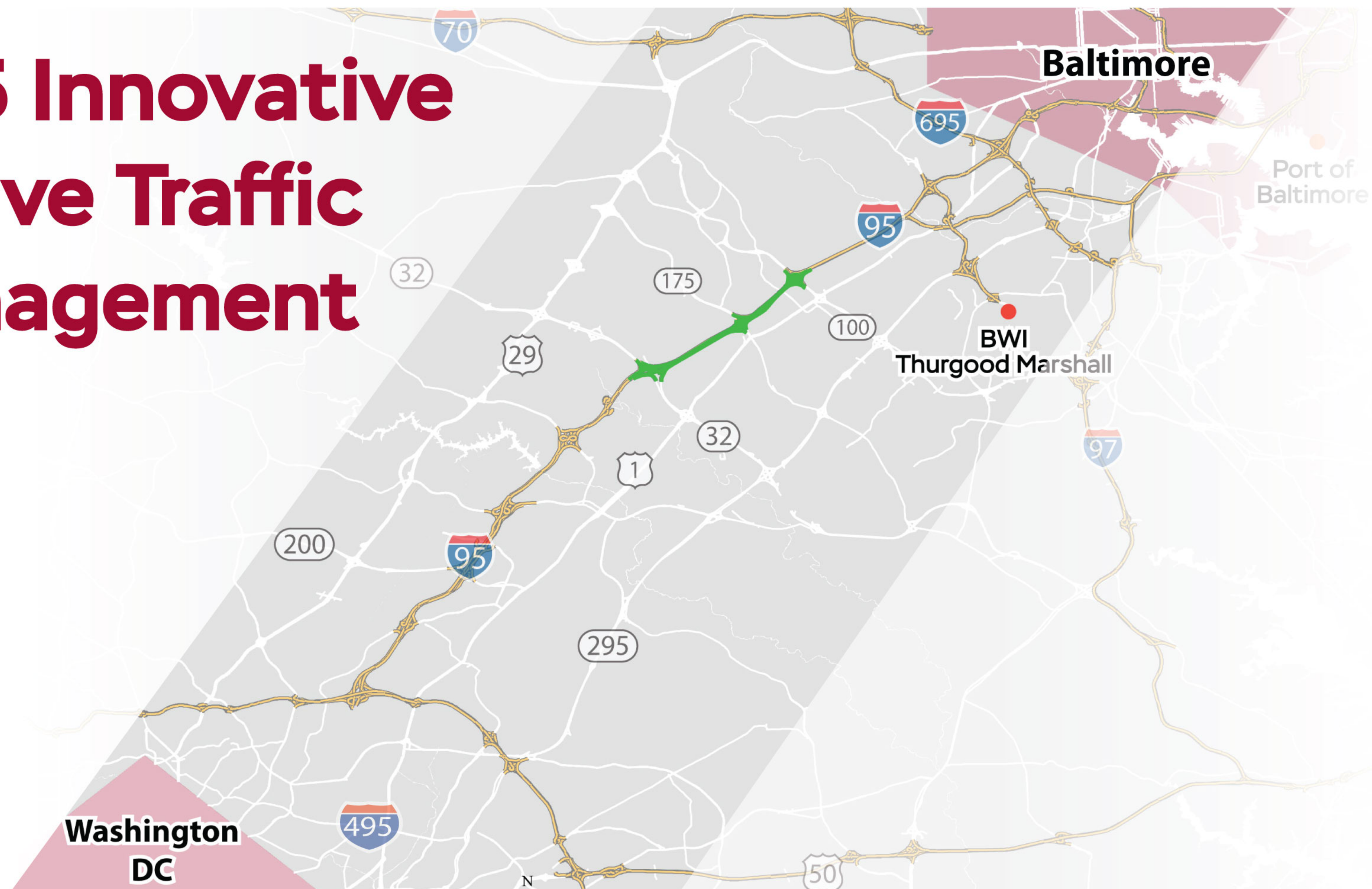


I-95 Innovative Active Traffic Management





I-95 Innovative Active Traffic Management

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Submitted By: Maryland Department of Transportation
State Highway Administration

Location: Howard County, Maryland

Project Type: Urban

Grant Request: \$11,500,000

Matching Funds: \$11,500,000

Total Project Cost: \$23,000,000



I-95 Innovative Active Traffic Management

PROJECT SUMMARY

Project Name	I-95 Innovative Active Traffic Management
Applicant	Maryland Department of Transportation State Highway Administration (MDOT SHA)
Contact Information	William R. Gayle Deputy Director of Policy and Innovation Office of Policy and Research Maryland Department of Transportation State Highway Administration 707 North Calvert Street, C-412 Baltimore, MD 21202 410.545.0342 Wgayle2@sha.state.md.us
Project Type	Urban
Project Description	MDOT SHA is improving a critical segment of I-95, from MD 32 to MD 100, to address safety, congestion, and travel time reliability. Current roadway capacity and interchange design in this heavy traffic and important freight corridor are producing substantial delays and high rates of crashes. The project will implement part-time shoulder use (PTSU) to mitigate congestion and accident risk, as well as new signage and geometric modifications to interchanges that will enable vehicles to enter I-95 more safely and efficiently. This project located between Washington, DC, and Baltimore, MD will have far-reaching positive impacts that support the county, state, and region.
Project Cost	\$23,000,000
TIGER IX Request	\$11,500,000
Other Sources and Amounts	\$11,500,000 – MDOT SHA
NEPA Status	A programmatic Categorical Exclusion is anticipated for this project, and NEPA approval is anticipated in advance of advertisement.
Completion Date	Second Quarter Calendar Year (CY) 2021
Benefit-Cost Analysis Results	Based on the BCA, The I-95 Innovative Active Traffic Management project is estimated to achieve a benefit-cost ratio of 7.57 at a 7 percent discount rate, and a 12.73 benefit-cost ratio at a 3 percent discount rate.
Supplemental Information	www.mdot.maryland.gov/TIGER



I-95 Innovative Active Traffic Management

I. PROJECT DESCRIPTION

Project Overview

Maryland's I-95 corridor is at the confluence of opportunity and innovation. With a burgeoning population and growing ranks of technology, defense, and health care companies, the section of I-95 located between MD 32 and MD 100 in Howard County is a critical freight and passenger corridor in Maryland and the region. Specifically, this segment of the National Highway Freight Network provides a key connection between Washington, DC, and Baltimore, MD, as well as Columbia to the northwest and Fort George G. Meade (Fort Meade) to the southeast (**Figures 1 and 2**).ⁱ Howard County is the fastest growing county in Maryland, and is poised to continue its rapid expansion.ⁱⁱ Existing safety and operational concerns demand the targeted infrastructure investments presented in this application (**Figure 1**).

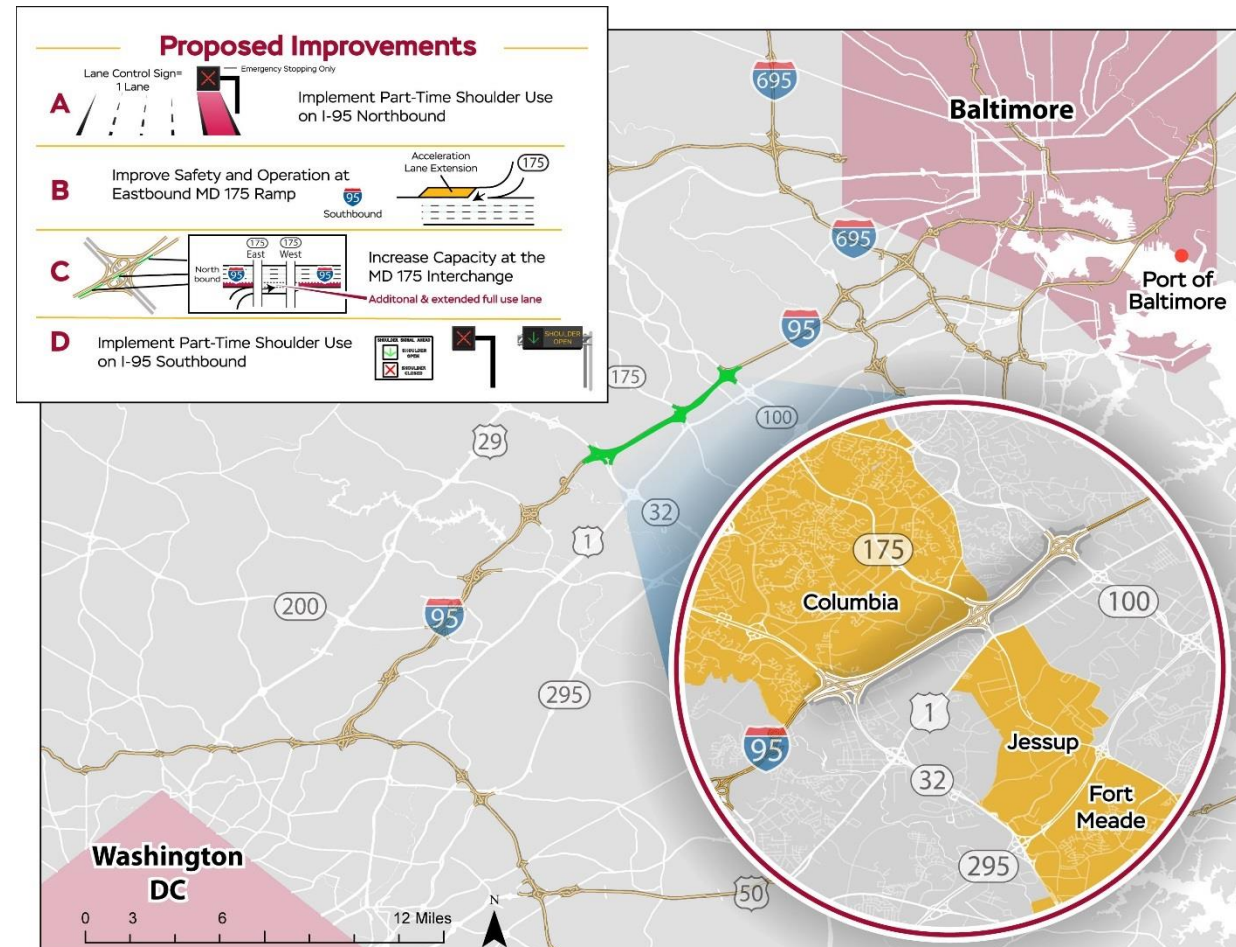
In addition to these major economic and residential hubs, demand for freight delivery in Maryland is

expected to double by 2035. The ability to safely and efficiently move people, freight, and goods through this active corridor is vital for national economic competitiveness, as well as that of the region and local communities.

To this end, the Maryland Department of Transportation State Highway Administration (MDOT SHA) is committed to planning and implementing infrastructure investments that ensure that the growth and opportunities in this

region do not result in negative impacts to safety, economic outcomes, or quality of life. MDOT SHA seeks to partner with the United States Department of Transportation (USDOT) to complete a package of infrastructure improvements that will

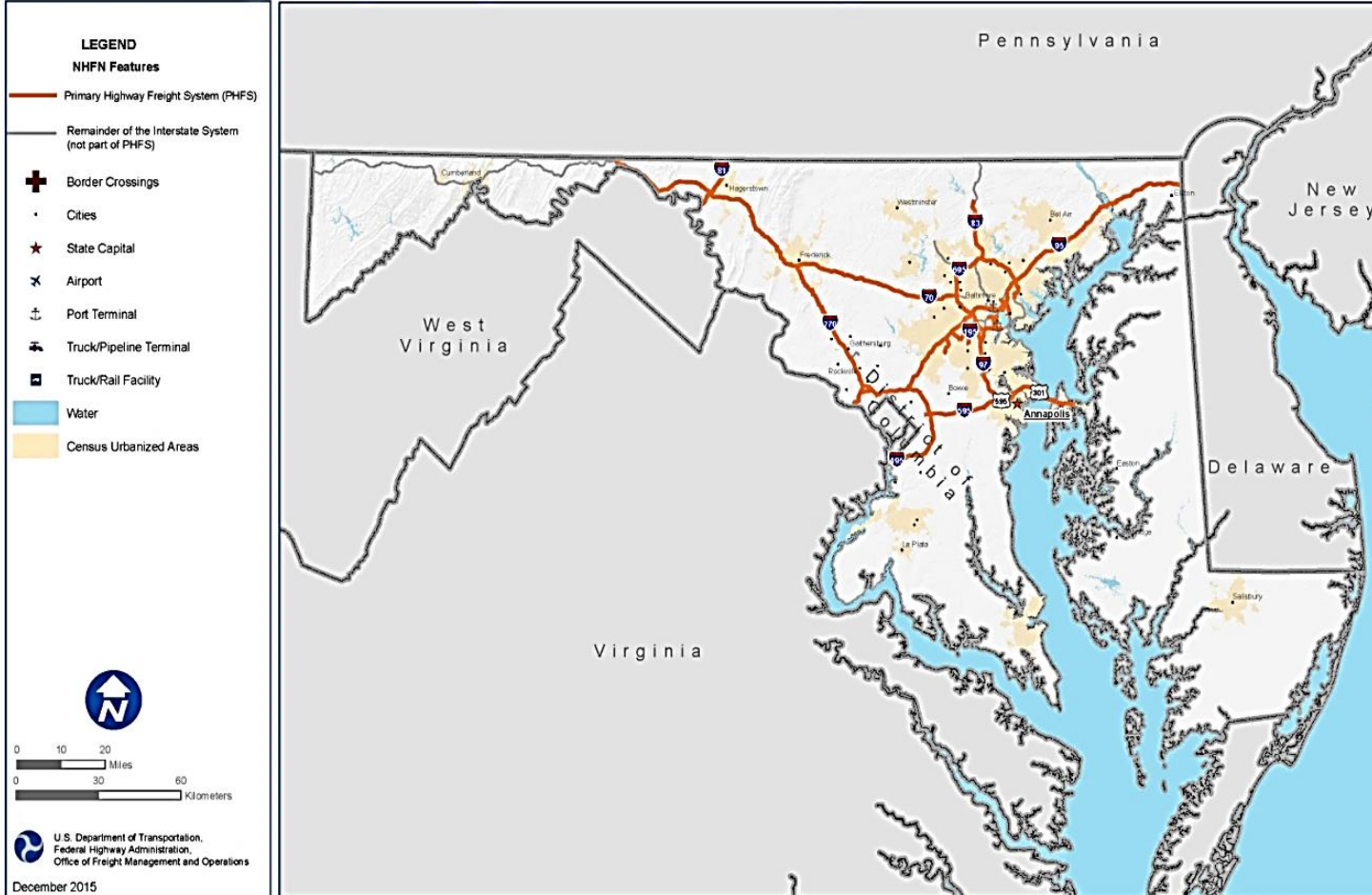
Figure 1. Project Location and Proposed Improvements





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Figure 2. National Highway Freight Network in Maryland



Currently, capacity limitations and highway design are resulting in major safety and congestion impacts. Crash rates in the project corridor are notably higher than elsewhere in the Maryland state highway network, making this a **high-priority safety project**. Over the past few years, there have been hundreds of crash-related injuries as well as multiple fatalities. **Current conditions in the project corridor result in over 431,000 hours of delay annually, with projections of over 3.3 million hours of delay by 2040.** The project will innovatively address these issues through a coordinated package of infrastructure improvements that will facilitate safer and more efficient vehicle movements through this high-traffic corridor.

MDOT SHA requests **\$11.5 million** in National Infrastructure Investments – also known as Transportation Investment Generating Economic Recovery IX (TIGER IX) – grant funds, which represents **50 percent** of total project costs. These funds will complete the funding package for a **\$23 million** project that confronts existing challenges in our interstate

improve critical infrastructure and enhance the safe and efficient movement of people, freight, and goods on I-95 and connecting highways.

Once funded, this TIGER project allows MDOT SHA to innovatively

provide congestion relief and safety improvements on I-95 between MD 32 and MD 100 in Howard County. The proposed improvements are an opportunity to provide a model for other jurisdictions and states for efficient, innovative, cost-effective active traffic management using

existing right-of-way. Improvements include part-time shoulder use (PTSU) during peak periods to create outside auxiliary lanes in both directions, interchange ramp improvements, and dynamic signing.



I-95 Innovative Active Traffic Management

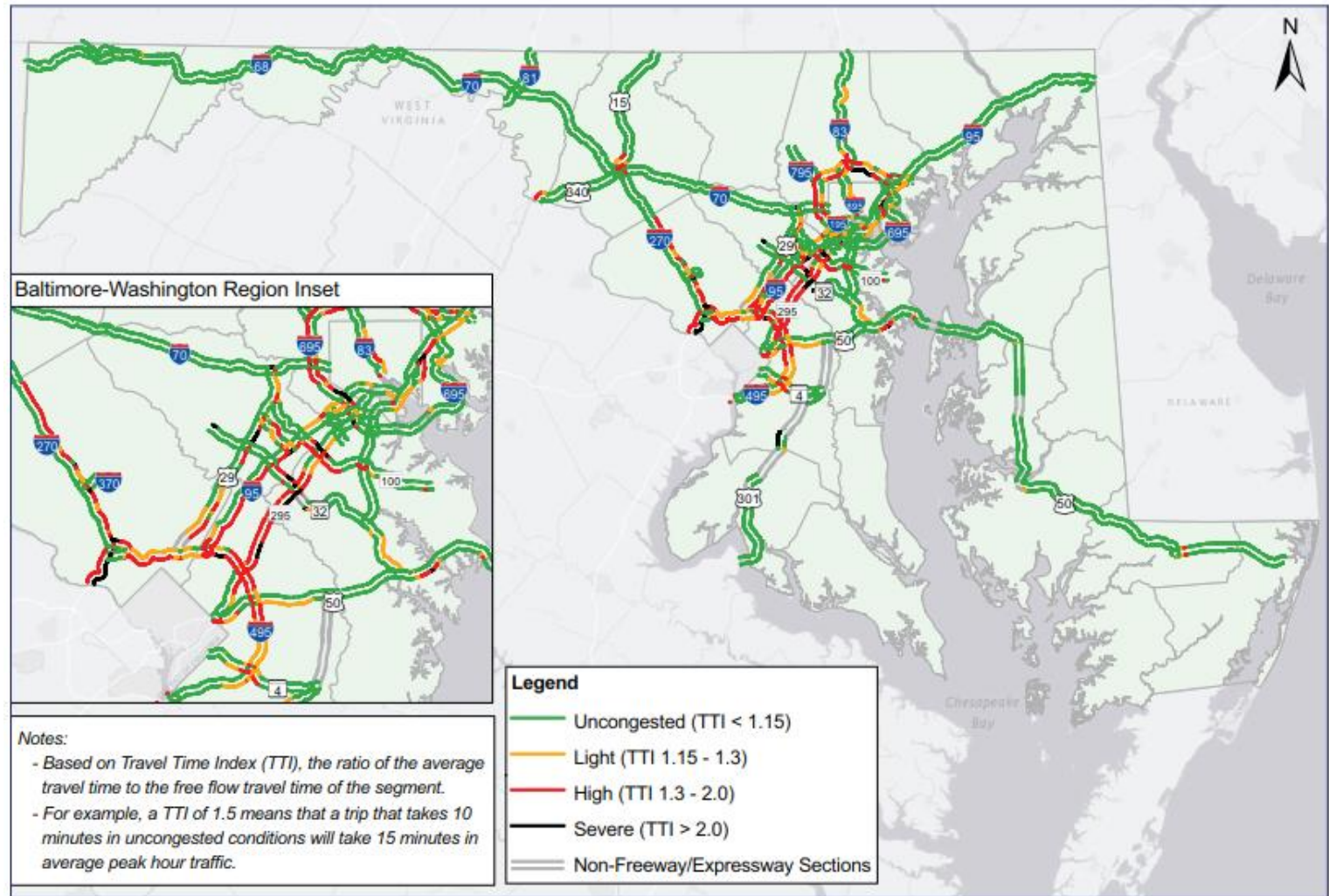
system and prepares for the growing development, population, job opportunities, and traffic volume in this dynamic area.

If awarded these funds, *I-95 Innovative Active Traffic Management* will have a catalytic effect in the growing area of economic opportunities and population growth, connecting residents to jobs and amenities, while at the same time creating a model of innovative congestion management and crash reduction that maximizes efficient use of state and federal funds.

Project Need

This TIGER IX project addresses safety and congestion issues on I-95 in the high-growth area connecting the Washington, DC, and the Baltimore, MD, metropolitan areas. Together, these two metropolitan areas constitute approximately three million people. Central Maryland, in which this project is located, contains close to half of the State's population and continues to lead the State's population growth. Additionally, this

Figure 3. Peak Congestion on Maryland's Highway Network (Strategic Goods Movement Plan)



corridor is proximate to and provides connections for over 50 federal agencies, universities, Fortune 500 companies; and technology, defense, and health care businesses. A large

percentage of the State's jobs are in this corridor. Additionally, many jobs outside of the corridor located east and west of I-95 are still served by I-95, making it critical to people's

ability to travel to and from their place of work.

For decades, traffic volume along the I-95 corridor has increased, resulting in frequent congestion during peak



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travel periods (**Figure 3**). A priority freight and trucking corridor that connects major cities on the East Coast, this route is crucial to the State of Maryland and national economy. The Federal Highway Administration (FHWA) cites this corridor as one of the most important on the National Highway Freight Network (**Figure 2**). **By 2040, more than 1 billion tons of freight, worth close to \$1.6 trillion, is expected to move within and through Maryland, much of which will center on and connect to this corridor of I-95.**ⁱⁱⁱ As **Table 1** presents, freight movement by truck comprises the overwhelming majority of freight movement within, from, to, and through Maryland.

On top of the ramifications of congestion, safety concerns are present in this area, with the MD 175 interchange listed on Maryland's top 10 Statewide Candidate Safety Improvement Sections (CSIS), and the MD 100 interchange among the top

50 CSIS locations. Rear-end crashes are often attributed to high levels of congestion, particularly at MD 32 and MD 175. Sideswipes are pronounced at the heavy merge and weave area at the MD 32 interchange.

Overall, crash and fatality rates in this segment are higher than the statewide average. Crash rates are also notably higher than segments with lower volumes, and appear to correlate with the peak periods. In the three-year study period reported in the September 2017 Feasibility Study Summary (included in Supplemental Materials), there were **257 crashes** at the I-95 interchange with MD 32 and **249 crashes** at the interchange with MD 175.^{iv} Tragically, three of these crashes resulted in fatalities in this segment.

In the absence of funding to improve this section of the I-95 corridor, congestion is anticipated to result in **over 3.3 million hours of delay annually** by 2040, and without any



likely improvement to its crash rate.

The private sector has taken notice of the many benefits of doing business in this corridor. Howard County is continually ranked among the most affluent, advanced, and educated communities in the United States. With the area's thriving, vibrant economy and welcoming business environment, it is a prime location for expansive economic and residential growth. However, existing agricultural preserves, wetlands, and development limit remaining developable land; as a result, areas that are developable, such as the

Columbia Gateway discussed below, have increasing density demands.

Planned development at the Columbia Gateway is expected to bring an additional 20,000 jobs to this "innovation district" immediately to the northwest of the project corridor by 2040, and, approximately 27,000 more residents. As vehicle loads increase, so too will existing safety concerns and congestion impacts.

Fort Meade, the largest employer in Maryland and connected to this project location via MD 32 and MD 175, also continues to grow to the south of this corridor in Anne Arundel County. This base houses major military and government agencies. Thousands of employees travel to Fort Meade daily, many of whom depend

Table 1. Percent of Shipments by Truck (2015 Maryland Strategic Goods)

Mode	Total	Within Maryland	From Maryland	To Maryland	Through Maryland
Truck Tonnage	83.9%	96.4%	92.0%	56.7%	84.6%
Truck Value	97.7%	97.9%	93.7%	94.4%	99.3%



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on I-95, MD 32, and MD 175 to do so.

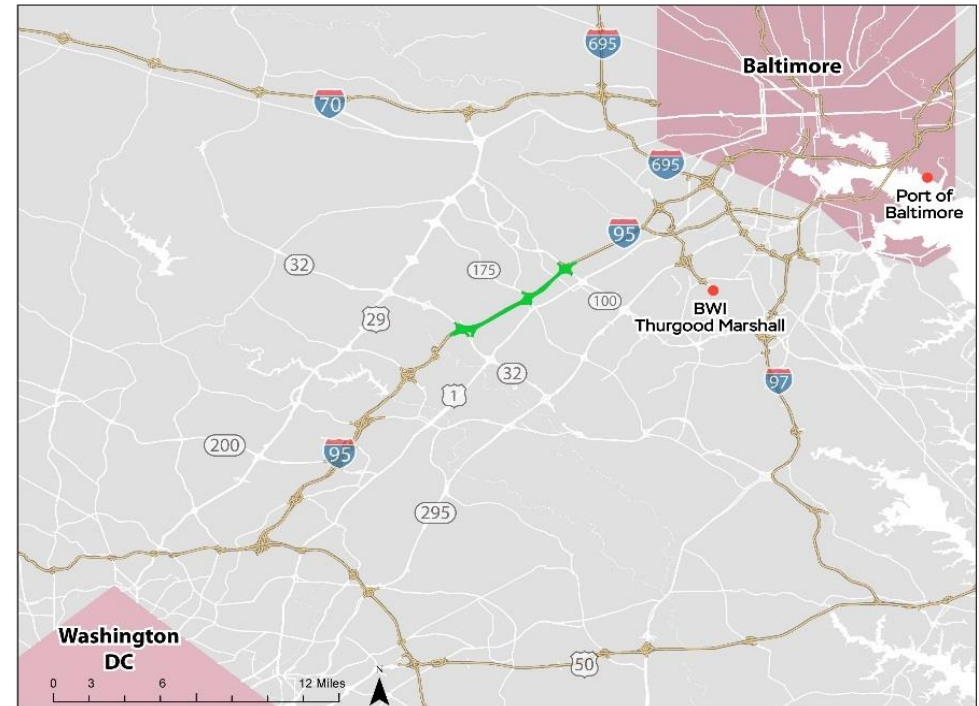
Compounding congestion, freight volumes out of the Port of Baltimore – a major economic driver for the region and the country – and the Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall) – a major cargo hub – are poised to dramatically increase in the region, particularly via I-95 to points south. The Port of Baltimore is a critical driver of maritime commerce in the United States, ranking as the top port in the country in handling autos and light trucks, farm and construction machines, imported forest products, sugar, and aluminum. In the first half of 2017, the Port handled \$26 billion in value. Continued growth in intermodal traffic at the Port will result in increasing truck volumes. Further, it is one of only five ports on the eastern seaboard capable of handling the new Post-Panamax ships.

BWI Marshall is a regionally- and nationally-significant hub for high-value, time-sensitive shipments, and a development hub for aerospace and national security contractors.

Additionally, it is the number one airport in the region in passenger volume and has seen significant domestic and international passenger growth. In support of this continued passenger growth, BWI Marshall is building a new International Concourse Extension, scheduled to be complete in 2018. In response to increased air cargo activity, BWI Marshall has expanded its Midfield Cargo Area, open November 2017. Together, these investments will support – and induce – further traffic volume in this corridor.

Without these sorely-needed infrastructure investments, the economic competitiveness of the region will be severely diminished, as MDOT will not be able to provide the safe, efficient, reliable transportation access residents and businesses demand. In the short-term, passenger and freight vehicles will face continued and increasing congestion, safety risks, and unreliable travel times. In the long-term, the region will suffer a loss in net economic activity due to the lack of efficient freight travel through the I-95 corridor and

Figure 4. I-95 Innovative Active Traffic Management Project Corridor



challenges of sustaining the demand for economic growth and expansion.

MDOT SHA's proposed TIGER IX project will address a major safety need; increase economic competitiveness at the regional, statewide, and national level; implement congestion mitigation strategies to improve environmental sustainability; and dramatically enhance the quality of life for all those

who live, work, and travel through this corridor (**Figure 4**). Most importantly for Maryland, this project will apply innovative strategies to enhance the safety and reliability of transportation infrastructure, while positioning MDOT SHA to deliver on its commitment to provide a safe, well-maintained, reliable highway system that enables mobility choices for all customers and supports Maryland's



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communities, economy, and environment.

State funds will match the TIGER IX grant by **\$11.5 million** for a total of **50 percent** of project costs for this priority project. TIGER IX funds will close the funding gap on a project that efficiently uses targeted funding in a corridor that will have ripple effects on efficient travel through the East Coast's I-95 corridor.

Project History

This proposed project is the result of over a decade of study and analysis of short to mid-term solutions to address safety and operational issues in the I-95 corridor from the Washington, DC, beltway to the Baltimore beltway (I-495 to I-695). The final concepts were vetted from a list of 17 concepts that came from previous studies MDOT SHA had conducted over the past decade (see the "I-95 Active Traffic Management (ATM) Feasibility Study Summary" included in Supplemental Materials).

The project team's goals were to design improvements that would:

1. Reduce the total number and severity of crashes, especially at interchanges, and ensure response times are not negatively impacted.
2. Reduce overall vehicle-hours of delay and improve reliability in the short and mid-term timeframe (2020 to 2030).
3. Demonstrate feasible capital costs, sustainable operating and maintenance costs, and a Benefit-Cost ratio of greater than one.
4. Target short- to mid-term (up to 10 years) implementation feasibility and construction.

The study acquired the latest safety and traffic operations data to further refine which intersections and segments had the most need within the larger beltway-to-beltway corridor. **This proposed project is in the section of I-95 in which the greatest safety and operational needs were identified due to the rate of crashes, hours of delay, and unreliable travel times, particularly during peak travel hours.**

Subsequently, MDOT SHA identified the specific infrastructure investments presented in the *I-95 Innovative Active Traffic Management* project as able to produce the greatest positive impacts on safe, efficient, reliable traffic movement with the most efficient use of limited funds.

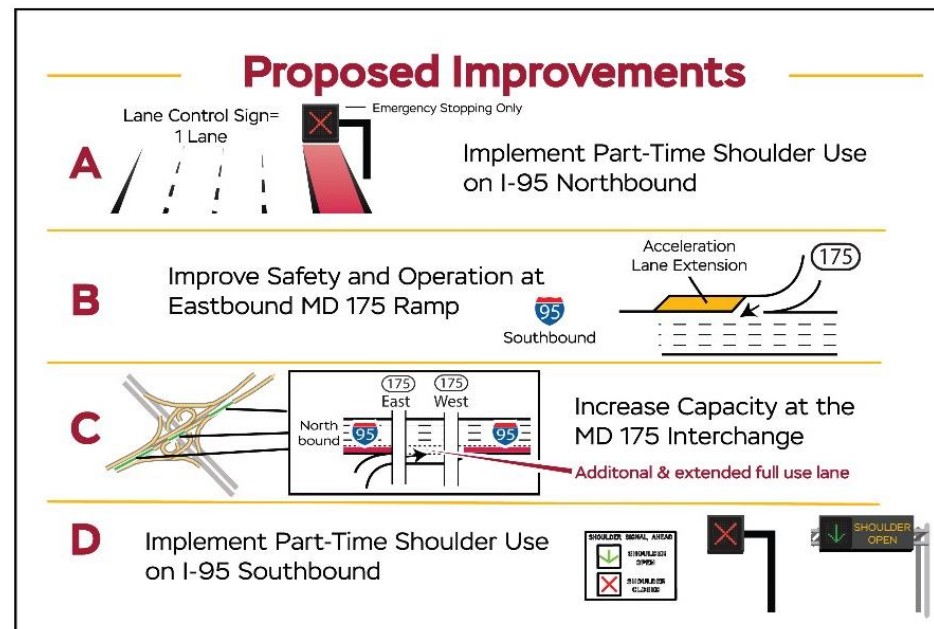
Project Elements

The purpose of the *I-95 Innovative Active Traffic Management* is to create safe and efficient highway access and operations in a critical corridor of I-95, fostering economic growth and local and regional connectivity. Each project element is geared toward creating a transportation network that provides safe and reliable facilities for all users.

This TIGER IX project applies strategic investments that work together to improve operations and safety in the I-95 corridor and compliment additional projects underway or in planning. The following project elements are illustrated in **Figures 5 and 6**.

A. Implement Part-Time Shoulder Use on I-95 Northbound

Figure 5. Project Elements





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Existing Conditions:

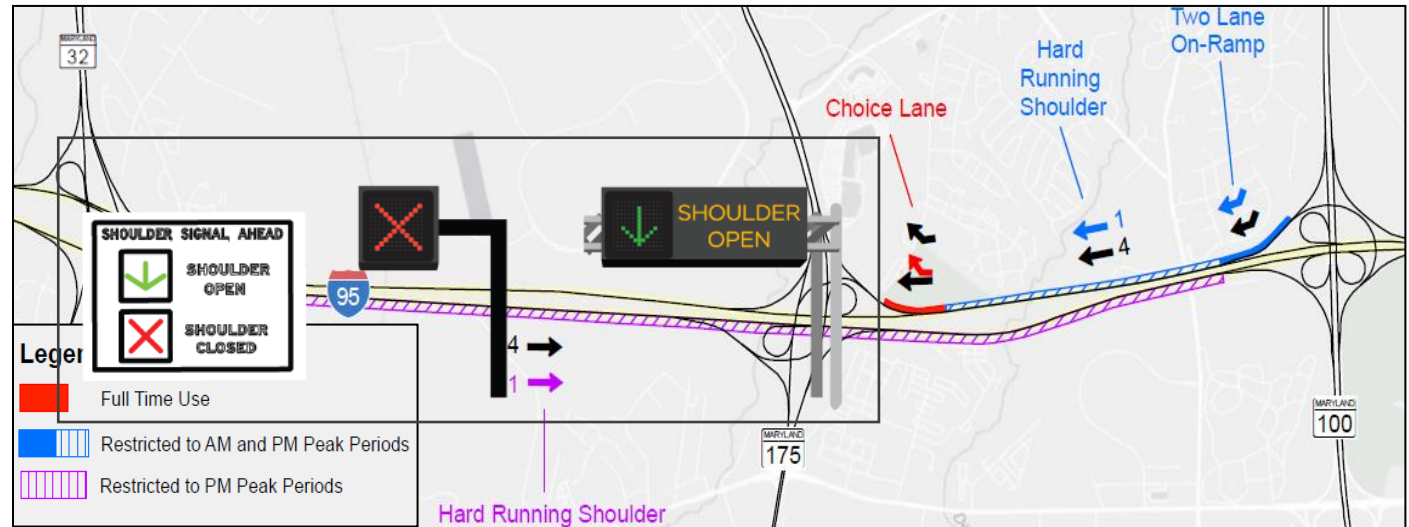
Peak hour conditions on I-95 northbound from MD 32 to MD 100 are heavily congested due to both heavy mainline traffic and ramp demand. The congestion on the mainline exacerbates safety concerns at the interchanges, as cars are forced to make unsafe weaves to accommodate for additional ramp demand.

Proposed Improvement:

Construct a PTSU lane, also referred to as “hard running shoulder” (HRS), from the MD 32 westbound ramp to the MD 100 westbound ramp. This PTSU lane spans approximately 3.5 miles from MD 32 to MD 100 along I-95 northbound. The major controlling factor for PTSU lanes on the outside shoulder was the need to mitigate the weaving section between MD 175 and MD 100. A left PTSU lane was briefly considered from the MD 32 left entrance ramp to past MD 100, but it was decided this would not be effective at solving the congestion issue along the northern section between MD 175 to MD 100.

Overhead Signage will play a critical role in the implementation of the

Figure 6. Project Component Overview Diagram



proposed improvements. The location, number, and design of these signs differs across the United States. Currently the project is designed to have an overhead sign signaling the PTSU lane’s operations at the beginning, end, and every half mile of the improvement. However, this does not preclude the use of additional overhead signs if more is needed due to safety concerns. A variety of options are under consideration, including electronic display signs. Safety considerations, utility location and proximity, and funding availability will ultimately determine the specific sign design implemented, though

MDOT SHA looks forward to exploring all opportunities to install multi-functional, flexible designs.

B. Improve Safety and Operations at the MD 175 Eastbound Ramp

Existing Conditions:

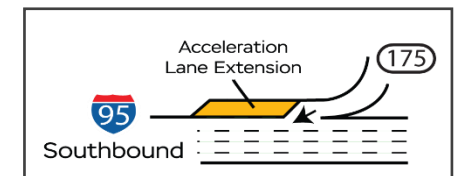
Vehicles from MD 175 eastbound going onto I-95 southbound do not have sufficient distance to merge safely onto I-95 southbound.

Proposed Improvement:

Extend the acceleration lane from the MD 175 eastbound ramp onto I-95 southbound. The acceleration lane extension was chosen at this location

due to the demand from MD 175 eastbound traffic to I-95 southbound.

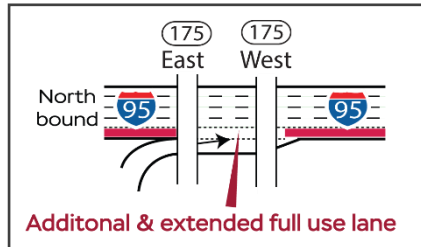
This improvement will help facilitate traffic entering I-95 to do so at mainline speeds, reducing bottlenecks and creating a safer merge environment.





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C. Increase Capacity at the MD 175 Interchange



Existing Conditions:

The MD 175 eastbound ramp onto I-95 northbound does not have sufficient length to facilitate safe merges onto the mainline. Combined with the PTSU lane, a full-time use lane was necessary to facilitate safe merges from the high-demand ramp.

Proposed Improvement:

Change the current shoulder to full-depth pavement in the same manner as the PTSU lanes. However, this lane will operate as a full-time lane to facilitate safe weaves between the PTSU lanes and the ramp. The acceleration lane will be extended, as well.

D. Implement Part-Time Shoulder Use on I-95 Southbound

Existing Conditions:

Peak hour conditions on I-95 southbound from MD 100 to MD 175

are heavily congested due to both heavy mainline traffic and ramp demand. There is insufficient distance to the merge points to allow for safe weaves, especially in congested conditions.

Proposed Improvement:

Construct a PTSU lane from the MD 100 on-ramp to the MD 175 off-ramp and re-stripe the furthest right mainline through-lane at the MD 175 interchange to create a choice lane. This will provide two lanes from both the MD 100 ramp and onto the MD 175 during peak hours. The PTSU lane will use full-depth pavement and mainline lane width, as described above. This will provide two lanes at the off-ramp and provide additional space for cars to weave at safe speeds.

With heavy traffic merging from MD 100 (1,880 vehicles per hour, or VPH, in the AM peak), and a heavy exit movement to MD 175 (1,865 VPH during the AM peak) the weave movement along I-95 southbound is especially heavy in this section. A right shoulder auxiliary lane would allow vehicles to make this weaving

movement in the shoulder and right lane as opposed to spilling into the mainline through lanes. Adding a short section of PTSU on the left shoulder would not be as beneficial for operations or fully alleviate the existing safety concerns.

Design Considerations

A major cost for installation of PTSU lanes is the full-depth pavement. While some states have opted to use the existing shoulders with minimal modifications to reduce cost, this generally prohibits truck use. Due to the high volume of trucks in this corridor as well as a major trucking facility immediately to the north of the project location, this would not be feasible and would ultimately result in pavement failure prior to the desired lifespan. Therefore, this project will apply shoulder reconstruction with full-depth pavement or concrete use.

The combination of heavy truck volumes and the desire to maximize capacity during the peak hours on I-95 also justifies the use of a full-width shoulder. While some jurisdictions narrow through-travel lanes to reduce new pavement, this is undesirable

given I-95's traffic operations. The project includes a full-width shoulder (12') that would act as a travel lane during peak hour operations, as well as an additional shoulder buffer to offer an offset from the edge of pavement. These designs would require a design exception, as there would not be a fully-useable (additional) shoulder during peak hour operations.

Together, these design considerations ensure that the implementation of PTSU lanes will maximize the useful life of the investment as well as the positive operational and safety impacts.

Although the project was developed using FHWA's *Use of Freeway Shoulders for Travel — Guide for Planning, Evaluating, and Designing Part-Time Shoulder Use as a Traffic Management Strategy*, as noted in the guidance document when shoulder use is introduced, there may be design elements below the criteria outlined in AASHTO's *A Policy on Design Standard-Interstate System or AASHTO's Policy on Geometric Design of Highways and Streets* (the Green Book).



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Two areas of the roadway geometrics were identified as needing design exceptions for bridge and shoulder width. Additionally, a design exception may be required for structural capacity. MDOT SHA would seek these design exceptions to allow for the cost saving approach of implementing a PTSU lane that can be implemented as proposed while improving the overall safety of I-95 in the study area.

Overview of Project Benefits and Outcomes

MDOT SHA's proposed TIGER IX project has myriad positive impacts for the county, state, region, and nation. Specifically, TIGER IX funds will empower MDOT SHA to invest in a project that will:

- **Improve travel time reliability;**
- **Decrease congestion and delay;**
- **Increase safety by reducing the number of crashes resulting in serious injury and fatalities; and**
- **Reduce CO2 emissions from congestion idling.**

By supporting the enormous economic activity already underway and programmed for development, this project will facilitate smart investments that will provide safe, reliable, and efficient movement of people, freight, and goods. Key impacts are outlined below.

Safety Outcomes

- Address a high-crash corridor by improving roadway geometries at key interchanges.
- Reduce crashes by **7 percent**, resulting in **87** fewer injuries and 1.4 fewer fatalities between 2022-2041.

State of Good Repair

- Reduce overall lifecycle costs by using part-time rather than full-time shoulder use.
- Increase the resilience of the transportation facilities by designing to meet the high freight volumes in this corridor.

Economic Competitiveness

- Preserve and improve the efficient, reliable movement of commuters, freight, and goods.
- Reduce delay by 2.3 million passenger hours.

- Improve access to employment centers and job opportunities through reliable and timely transportation infrastructure.
- Facilitate traffic flow to and from major, growing economic, business, and job centers at the Port of Baltimore, BWI Marshall Airport, Columbia Gateway, and Fort Meade.

- Reduce carbon dioxide emissions by 2,555 tons by 2040.
- Avoid adverse environmental impacts by using MDOT SHA's existing right-of-way.

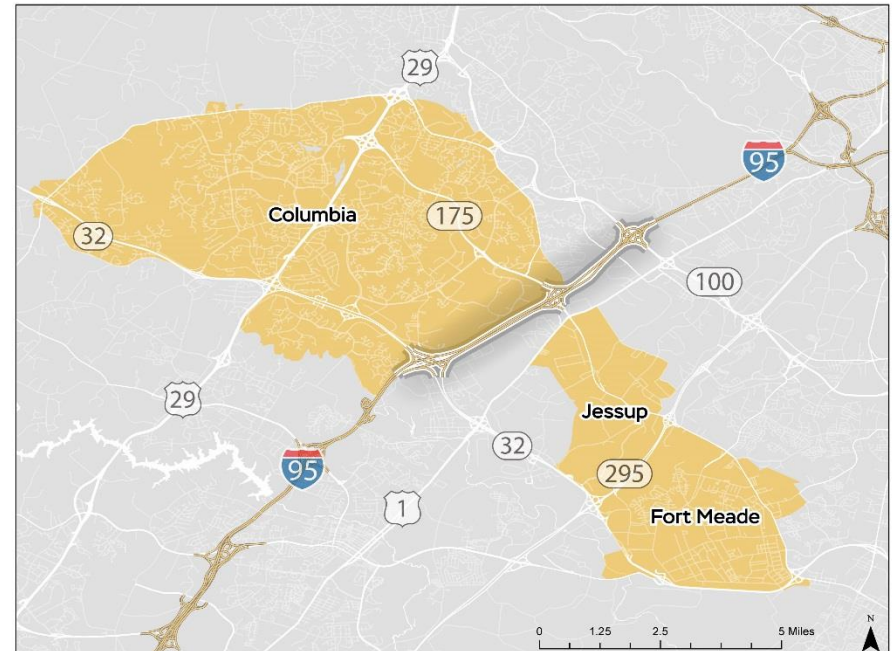
Quality of Life

- Improve access to jobs and essential services for those who live and work in nearby communities, or depend upon this corridor for access.

Environmental Sustainability

- Reduce hours of delay by 7,400 hours per day, saving **3,200 gallons** of gasoline per day by 2040.

Figure 7. Project Location, Surrounding Area, and Key Connections





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Innovation

- Apply Agile Development methodology (detailed further in the Innovation discussion).
- Implement a new type of Active Traffic Management that MDOT SHA intends to roll out throughout its system.
- Explore innovative project delivery methods, such as design-build.

Partnership

- Implement infrastructure improvements that support and coordinate with economic development plans in the region.

II. PROJECT LOCATION

The Washington, DC, to Baltimore, MD, “beltway-to-beltway” I-95 corridor is one of the most heavily traveled highways in Maryland, with vehicles loads of over **200,000 vehicles per day**, approximately 20,000 of which are trucks. Connecting the United States from Florida to Maine, I-95 is truly the East Coast’s Main Street. I-95 and its connecting highway corridors provide

residents, workers, and businesses with critical access to jobs, healthcare, education, and myriad other services and amenities that keep the United States moving. **With its proximity to Washington, DC; and Columbia, Fort Meade, and Baltimore, MD, I-95 in Maryland is one of the most trafficked segments of highway in the region.** Connecting to this corridor, MD 32 and MD 175 provide access to Fort Meade, the National Security Agency (NSA), and other vital government and military facilities. To this end, congestion and unreliable travel times in even a small segment of I-95 can have rippling impacts throughout the region.

The project is located within Howard County, Maryland, approximately three miles inside its eastern boundary with Anne Arundel County in the Baltimore, MD Urbanized Area (**Figure 7**). The three-mile segment of I-95 in which the project is located is a state-maintained, two-way, eight-lane, divided, urban interstate with fully-controlled access and a posted speed limit of 65 mph. Two cross corridors – MD 32 and MD 100 – compose the segment boundaries,

with improvements at the interchange with MD 175 between MD 32 and MD 100.

MD 175 is a state-maintained, two-way, six-lane, divided, urban minor arterial with a posted speed limit of 50 mph through the project area. This partial cloverleaf interchange has six directional ramps, two loop ramps, and two signalized intersections. MD 32 is a state-maintained, two way, four-lane, divided, urban principal arterial with a speed limit of 55 mph through the study area. MD 32 becomes a six-lane divided roadway north of the interchange with I-95. This partial cloverleaf interchange has two loop ramps, four traditional (right-handed) directional ramps, and two left-handed directional ramps: from MD 32 southbound to I-95 northbound and from MD 32 northbound to I-95 southbound.

Priority Funding Areas (PFAs) are existing communities and areas that local governments designate to target state investment for future growth. **This TIGER IX project is located within the Howard County PFA** between the towns of Columbia and Jessup. As

population growth is expected to continue in the areas surrounding the proposed improvements to I-95, traffic volumes would likely increase, and the need to update highway infrastructure to support additional development would continue. Several key hubs of economic activity are integrally connected through the project corridor, as discussed below.

Fort Meade

Fort Meade is a United States Army installation that is home to the NSA, Central Security Service, United States Cyber Command, and the Defense Information System Agency, as well as other military agencies and services. Maryland’s largest employer and the third-largest workforce of any Army installation in the U.S., Fort Meade employs over 52,000 people, over 82 percent of whom do not live on the base. Consequently, safe, efficient access to and from Fort Meade for these commuting employees is critical.



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Due to Base Realignment and Closure (BRAC) coupled with continued cybersecurity growth, tens of thousands of new jobs have flowed into the Fort Meade area (an economic impacts report is included in Supplemental Materials).^v Located five miles east of I-95 and connected to the interstate via MD 175, ensuring that the highway infrastructure can support this growing economic engine is a primary concern.

In 2014, MDOT SHA was awarded a \$10 million TIGER VI grant to upgrade MD 175 from a two-lane highway to a six-lane highway, improving traffic operations and safety. Connecting Fort Meade to I-95, MD 175 is one of the area’s key transportation arteries. New sidewalks, on-road bicycle

facilities and a trail dramatically improved the transportation infrastructure around Fort Meade. The roadway expansion is currently under construction and is expected to open to traffic in December 2019.

Columbia, Maryland

Howard County has seen a 34 percent increase in population over the past decade, which is projected to continue particularly in and around Columbia. With over 100,000 residents, Columbia is Maryland’s second most populous community and continues to grow. The Downtown Columbia plan calls for an additional 13 million square feet of retail, commercial, residential, hotel, and cultural development

implemented in 3 phases over the next 30 years.

With major employment drivers, a diverse and thriving population, recreational and retail options, and proximity to both Baltimore and Washington, DC, Columbia is home to many residents who then commute elsewhere as well as those who commute to Columbia for employment and other services and amenities. With direct connections to I-95 via both MD 32 and MD 175, these interchanges are critical to facilitating access to and from Columbia.

One of the major drivers for future population growth – and thus traffic in the area – is the Columbia Gateway Commerce (Columbia Gateway)

redevelopment project. Seeing this redevelopment advance is one of Howard County’s top economic development priorities, as it is envisioned to be a major economic driver for the county and the State. Already home to over 400 businesses, including cyber security firms and multinational corporations, this 920-acre mixed-use development is expected to bring an additional 20,000 jobs to this “innovation district” located immediately to the northwest of the project corridor by 2040. Additionally, approximately 27,000 more residents are expected to occupy over 15,000 new household units (**Table 2**).^{vi}

Further, Howard County is also actively pursuing the opportunity to house Amazon’s second headquarters



Table 2. Projected Growth from the Columbia Gateway Redevelopment Project

	Model 2017	Model 2040	Proposed 2040
Population	1,137	1,118	27,842
Household Units	518	518	15,185
Retail Employment	1,752	1,831	2,629
Office Employment	11,348	11,856	32,899
Industrial Employment	1,455	1,520	0
Other Employment	4,105	4,289	0
Total Employment	18,660	19,496	35,528



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(Amazon HQ2) at the Columbia Gateway business park, which would potentially bring 50,000 jobs. Regardless of Amazon's HQ2 decision, Columbia Gateway will house major businesses and employment opportunities with regional economic impacts.

Between their two counties, Howard County and Anne Arundel County have three hospitals to provide healthcare services to their populations. However, to the north, Baltimore City and its metropolitan area is home to some of the top hospitals and specialized care facilities in the world. This project would expand and improve Howard and Anne Arundel Counties' populations' access to health care.

Without proactively addressing these impacts, the positive outcomes of this transformative redevelopment that will bring thousands of much needed jobs to the region will be undermined; growing automobile and truck traffic will exacerbate the existing operational and safety concerns in this important corridor.

City of Baltimore, Maryland

Two major growth areas in Baltimore will continue to drive population, economic, and traffic growth to and from this major American city along the I-95 corridor. As discussed above, the Port of Baltimore is a locally-, regionally-, and globally-significant economic driver. The recently-complete Panama Canal Expansion (Panamax) continues to drive the growing volume of containerized cargo flowing through the Port of Baltimore – one of only five east coast ports with the infrastructure to accommodate post-Panamax ships. To this end, the Maryland Port Administration recently completed the purchase of additional land to support this growth, which hit record highs in 2016 following the Canal's opening, and has continued to grow by nearly 10 percent in 2017. Much of this cargo travels to and from the Port of Baltimore via I-95; consequently, reliability is a key component to the ability of the Port – and thus the nation – to remain globally competitive.

Baltimore has recently seen major distribution centers move into the

area, with two Amazon distribution centers on Broening Highway (supported by a TIGER VII investment of \$10 million in the freight corridor), a FedEx distribution center, and a major Under Armour distribution center, and additional distribution and retail development at Tradepoint Atlantic. **Together, these significant distribution centers demand safe, efficient access to the region and the world.**

The ongoing development at Port Covington in South Baltimore located along I-95 is slated to dramatically increase highway traffic as billions of dollars of private investment flow into new residences, employment centers, retail, entertainment, and amenities. As this 260-acre development grows, so too will vehicular and truck traffic to Baltimore from points south. As is the case with Columbia, Port Covington is also actively pursuing the Amazon HQ2 opportunity to complement the new world headquarters for Under Armour.

III. PROJECT PARTIES

MDOT SHA is entrusted with guiding the safe, efficient mobility of all those who live, work, and travel in Maryland. As one of the Maryland Department of Transportation's (MDOT) Transportation Business Units (TBUs), MDOT SHA is guided by MDOT's mission statement to be "a customer-driven leader that delivers safe, sustainable, intelligent, and exceptional transportation solutions in order to connect customers to life's opportunities."

I-95 Innovative Active Traffic Management represents the interdisciplinary approach to transportation planning at the core of MDOT SHA's vision: "Provide a safe, well-maintained, reliable highway system that enables mobility choices for all customers and supports Maryland's communities, economy and environment." MDOT SHA, who has a proven track record for grant oversight and implementation, will be responsible for grant implementation, including day-to-day management, coordination among project partners,



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quality control, and project evaluation.

IV. GRANT FUNDS, SOURCES, AND USES OF ALL PROJECT FUNDING

Table 3 presents the funding sources and uses by project element. MDOT SHA will contribute \$11.5 million in State funding at a 50 percent match to the requested \$11.5 million in TIGER IX funding. Additional information about MDOT SHA's capacity to fund the project and its experience with

similar projects is discussed in Financial Feasibility under Project Readiness.

V. MERIT CRITERIA

Primary Selection Criteria

Safety

Improving safety is at the heart of this TIGER IX application. **The project elements presented this application work together to create a safer highway environment.** Together, they mitigate existing safety risks through design improvements and capital investments. Specifically, the PTSU lanes on I-95 northbound and southbound will eliminate or reduce

the speed differential between merging traffic and mainline traffic by providing significantly more distance in which to accelerate and safely merge; the improvements will relocate the weaving section to allow more stable flow in the outside lane. Overall, crash this project can be expected to **reduce crashes by approximately 7 percent**, which will could result in 1.4 fewer fatalities and **87 fewer injuries between 2022 and 2041.**

The MD 175 Interchange is listed among the top 10 CSIS locations. A study of recent crash data from January 1, 2012 to December 31, 2014 found that above average crash patterns existed at the interchanges within the project corridor (the I-95 Planning Study, Existing Conditions Report is included in Supplemental Materials). For the 3 years of crash data, 257 crashes were recorded at MD 32 and 249 crashes were recorded at MD 175. In total, these crashes injured 125 people and resulted in 3 fatalities. With traffic volumes consistently increasing in this corridor, these safety issues and

outcomes are only expected to continue or worsen.

The economic value of the safety benefits discussed in the Benefit-Cost Analysis (BCA) (**Appendix A**) are quantified as approximately \$9.3 million (at the 7 percent discount rate).

State of Good Repair

This TIGER IX project is consistent with MDOT SHA's efforts to improve the condition of existing transportation facilities and systems, maintaining assets in a state of good repair to minimize life cycle costs and improve resilience. Operation and maintenance on Maryland's state highways are performed by MDOT SHA; with over 17,000 lanes miles to operate, MDOT SHA is keenly aware of the critical need to maintain its system to safely and effectively move people and freight.

MDOT SHA has undertaken careful analysis and feasibility studies to identify solutions that address operational, safety, and capacity deficiencies and vulnerabilities in the transportation network impacting the

Table 3. Project Funding Summary by Element and Source

Project Funding Summary		Full Project	
Project Element		Project Cost (\$ millions)	
A. Implement Part-Time Shoulder Use on I-95 Northbound		\$13.4	
B. Improve Safety and Operations at the Eastbound MD 175 Ramp		\$0.7	
C. Increase Capacity at the MD 175 Interchange		\$1.3	
D. Implement Part-Time Shoulder Use on I-95 Southbound		\$7.6	
Total Project Cost		\$23 million	
Sources and Uses		Amount	% Contribution
TIGER IX Grant Fund Request		\$11.5	50%
MDOT State Highway Administration		\$11.5	50%
Total		\$23	\$11.5
Total Local Match			50%



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I-95 corridor, as well as the surrounding communities, as discussed under Project History. It is critical that the State address these transportation deficiencies to support a robust regional economy through the critical movement of people, goods, and services along the East Coast, as well as the connecting communities and job centers.

The *I-95 Innovative Active Traffic Management* project will directly address the State of Good Repair objective by including funding for:

- Reducing overall lifecycle costs by using part-time rather than full-time shoulder use.
- Increasing the resilience of the transportation facilities by implementing full-depth pavement in the PTSU lanes to accommodate the large volumes of truck traffic which will use this lane, prolonging its useful life
- Capitalization of MDOT SHA's up-front project costs.
- Applying asset management approaches that optimize assets' long-term cost structure.

- Implementing the plan to maintain this infrastructure in a state of good repair.

Economic Competitiveness

The proposed TIGER IX project will **decrease transportation costs and improve access through reliable and timely access to employment centers and job opportunities throughout the I-95 corridor**. As previously discussed throughout this application, the project is located at a key section of I-95 and its interchanges with MD 32, MD 175, and MD 100; together, these corridors connect Washington, DC, to points north; Baltimore, MD to points south; the Columbia area (Howard County, MD) to I-95; and Fort Meade (Anne Arundel County) to I-95. **The proposed improvements preserve and improve the long-term, efficient, reliable movement of commuters, freight, and goods.** Further, business and employment opportunities that result in long-term job creation are more likely to locate and stay in areas in which transportation is efficient and reliable.

As previously discussed in Project Need, this section of I-95 is in a major

freight corridor. Connecting the major metropolitan areas, manufacturing and distribution centers, and the Port of Baltimore, and BWI Marshall, delays and inefficiencies have cascading impacts to the movement of goods and freight at the local, regional, national, and even global level. The freight network is the foundation of a supply chain that



supports diverse companies and institutions. Reliable access to the air and water ports, highways, and rail networks enable businesses to meet their customers' needs in the State and beyond. A free-flowing freight system leads to lower costs of goods that consumers and companies need for good quality of life and successful enterprise.

Ensuring that the network of highways – and the connections to railways, waterways, and airports - is ready to handle the current level and anticipated growth of goods movement is an MDOT priority. The Department's overarching goal is to help improve Maryland's economy by making the goods movement system more efficient, reliable, and safe.

By preserving and enhancing the safe, efficient, reliable movement of freight, I-95 Innovative Active Traffic Management will support the United States' ability to compete in the global economy. In the absence of these important investments in an economically-significant corridor, congestion and unreliable travel times will undermine the economic



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competitiveness of the region and nation.

Specifically, this project will:

- **Reduce delay at peak times by 75 percent, saving travelers in this corridor over 2.5 million hours of delay per year.**
- **Contribute to safe and efficient freight movement as demand increases.** Demand for freight traffic is expected to double in Maryland by 2035, and increase by 75 percent in this segment between the Washington, DC, and Baltimore beltways in the same period.
- **Facilitate traffic flow to and from major, growing economic, business, and job centers,** including the proposed Columbia Gateway development, which is expected to contribute 20,000 jobs, and increase the population by 27,000 residents along the corridor by 2040; with an estimated commuter demand increase of 16 percent VMT by 2035.
- **Safely facilitate commuter traffic flow** for commuters on the

corridor, which will increase approximately 16 percent by 2035.

- **Increase long-term job creation for the region** by providing an efficient commuter corridor between Washington DC and Baltimore, as well as Fort Meade and Columbia to the I-95 corridor.

The economic value of the economic competitiveness benefits discussed in the BCA are quantified as over \$124.2 million (at the 7 percent discount rate).

Environmental Sustainability

The *I-95 Innovative Active Traffic Management* project is designed to reduce congestion on an already-crowded transportation corridor; existing congestion results in higher emissions, impacting air quality and the environment. In the absence of these critical investments, congestion is expected to increase due to population and job growth in the DC-to-Baltimore corridor. Growing freight movement will also contribute to this congestion and emissions. By reducing congestion, project improvements will increase efficiency of travel on the corridor and decrease



idle time for thousands of vehicles. **These travel hours saved will ultimately reduce energy use and improve future air quality.** Facilitating the efficient movement of automobiles and trucks, *I-95 Innovative Active Traffic Management* is expected to **reduce emissions by about 2,555 tons of carbon dioxide by 2040** compared to conditions without these investments.

Specifically, these improvements will lead to:

- An average of almost **7,400 fewer hours of delay time per day**, which is equivalent to approximately 3,200 gallons of gasoline saved in time spent on the road.

- Saving 2,555 tons of carbon dioxide by 2040.

The project will **avoid adverse environmental impacts wherever possible by using MDOT SHA's existing Right-of-Way (ROW)**. In cases where there may be some impact, the proper minimization and permitting requirements will be addressed. MDOT SHA has already undertaken a preliminary environmental assessment to identify sensitive resources within the project area and associated plans to mitigate impacts. These resources include:

- Six publicly-owned parks.
- Six historic resources either listed in or eligible for the National Register of Historic Places close to the project location.



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- Minority and low-income populations.
- Three waterways and their tributaries, as well as nontidal wetlands and hundred-year floodplain.
- Forest Interior Dwelling Species Habitat and Sensitive Species Project Review Areas.

To preserve the resources above, the project team is committed and prepared to ensure that impacts are avoided wherever possible and apply relevant design or mitigation strategies where needed. Further, the project uses existing pavement, which avoids adding new impervious surface.

MDOT SHA is also prepared to obtain necessary permits, and work to do so is already underway. The project team has already identified potential requirements, with which MDOT SHA has extensive experience achieving efficiently and collaboratively, which may include a Section 404 Clean Water Act Permit and various Maryland Department of the Environment Permits.

The economic value of the environmental benefits discussed in the BCA are quantified as over \$0.2 million (at the 7 percent discount rate).

Quality of Life

The proposed project will positively impact nearby communities' quality of life by improving access to jobs, essential services, reducing travel times, preserving the safety of individuals, and reducing noisy and polluting traffic congestion. Peak hour congestion leads to crashes, delay, decreased travel time reliability, and longer travel times to places of work, education, healthcare, and other daily needs and amenities.

By improving access to and from I-95 and MD 32 and MD 175, **the project elements will increase overall access to jobs and essential services for those who live and work in nearby residential, commercial, and institutional developments,** which comprise the majority of the nearby land use. Existing conditions show that congestion in the corridor is highest during peak commute times;

specifically, the morning peak in the southbound direction and the afternoon peak from MD 175 eastbound to I-95 southbound exhibit the lowest travel time reliability and highest travel times.

Further, vehicular crash analysis suggest that these safety concerns correlate to worker commute times to jobs and places of employment during the morning and afternoon peak periods. Crashes dramatically impact individuals' and families' quality of life – repair costs, injuries, medical costs, time away from work, and the overall emotional, physical, and financial burden can have long-term negative impacts.

Time spent sitting in congestion is time not used productively or enjoyably. Consequently, by improving traffic flows through this corridor, *I-95 Innovative Active Traffic Management* investments will improve workers' quality of life by decreasing the time they are spending sitting in congestion instead of with their families, at their place of business, or enjoying leisure activities.

Specifically, this project will enhance quality of life by:

- **Reducing crashes by seven percent** will also increase the daily safety of commuters on the corridor.
- Reducing congestion will improve quality of life for those who live or spend time in nearby communities by reducing the noise and poorer air quality associated with standing or slow moving traffic.

This project will increase transportation choices for individuals to provide more freedom on transportation decisions. Decreasing travel time and increasing reliability in this section may also enable travelers to connect more efficiently to transit options in the area. Specifically, MD 32 and MD 175 provide access to MARC, whose service area within the study area connects Baltimore, MD, to Washington, DC.

Secondary Selection Criteria

Innovation

MDOT SHA current does not operate any PTSU lanes on their facilities. As such, part of the task of planning the



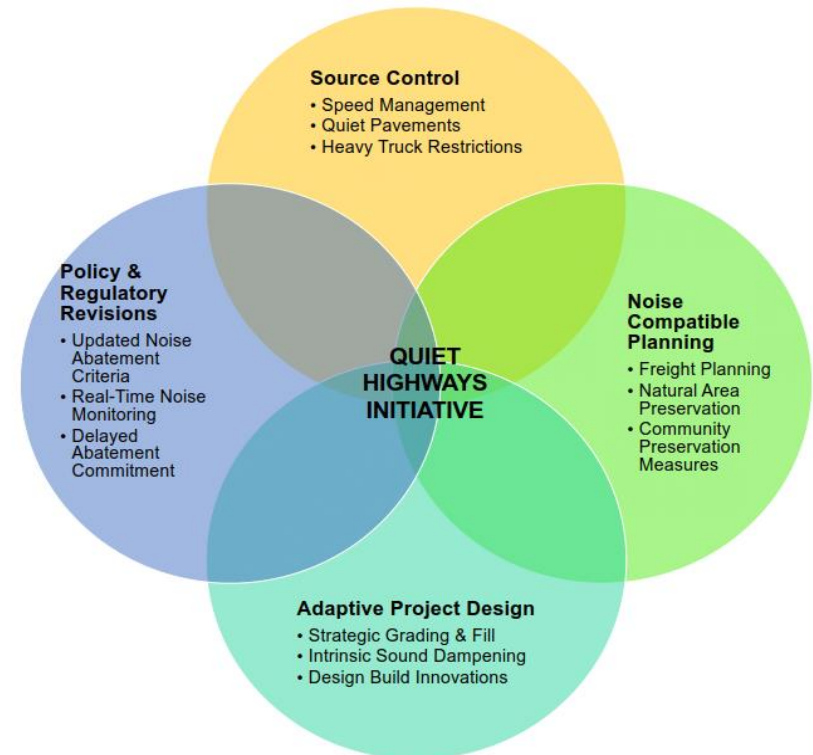
I-95 Innovative Active Traffic Management

I-95 Innovative Active Traffic Management project was to ensure all internal stakeholders not only had input in how the state will build, operate, and maintain PTSU lanes, but also actively participated in the project's completion. Therefore, the planning team adopted concepts from Agile Project Management, which are methods typically used in software projects, to distribute the major hurdles of the projects to their subject matter experts. When in the past, a planning project manager may ask another internal department to review a small piece of the project; we now have each of the major departments within MDOT SHA working side-by-side to deliver this comprehensive project. The *I-95 Innovative Active Traffic Management* project will provide MDOT SHA with an opportunity to apply a new approach to active traffic management in this critical corridor that will serve as a model to other jurisdictions and states. This project will integrate this new approach of PTSU with signage and roadway geometric improvements to **comprehensively address a variety of known challenges in this area and**

enhance the operational and safety performance of the transportation system. Further, as discussed under Project History, travel-time reliability is a core metric for MDOT SHA's project development and selection process. While this innovative metric is not currently captured in traditional Benefit-Cost Analysis, it is a key performance indicator for the agency. Not only does MDOT SHA seek to reduce vehicle miles traveled (VMT) and vehicle hours traveled (VHT), but also to prioritize drivers' – MDOT SHA's customers – ability to reliably plan their travel reliably.

MDOT SHA is interested in exploring innovative project delivery methods to ensure the most efficient, high-quality, fiscally responsible project is designed and constructed. To this end, MDOT SHA evaluates all its project on a case-by-case basis to determine the best project delivery method given the project's unique characteristics and needs. MDOT SHA has been delivering projects utilizing the Design-Build project delivery method for 20 years. Over 45 projects valued at over \$900 million have been delivered with MDOT SHA's Design-

Figure 8. MDOT SHA's Quiet Highways Initiative



Build program. Additionally, four contracts for the Intercounty Connector Mega-Project valued at over \$1.5 billion total were delivered as Design-Build.

MDOT's Coordinated Highways Action Response Team (CHART) is a joint effort of MDOT, the Maryland Transportation Authority, Maryland State Police, and other state and local agencies. CHART's mission is to

improve "real time" operations of Maryland's highway system through teamwork and technology. CHART has been operating since 2012 from the Statewide Operations Center (SOC); however, recent efforts have focused on ways in which to modernize the SOC. For the past two years, the CHART leadership team has collaborated on redesigning the current facility to accommodate for future growth (e.g., new staff, new



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technologies) and improve efficiency, communication, and functionality. Construction for this modernized facility will soon be underway, with the new SOC complete prior to Summer 2020. This facility will be the point from which the proposed PTSU lanes in this application will be operated.

MDOT SHA Office of Planning and Preliminary Engineering recently undertook a Quiet Highways Initiative, which seeks to design and implement traditional and innovative ways to reduce the intensity, duration, and frequency of highway noise impacts using a holistic framework (**Figure 8**). MDOT SHA is committed to exploring all opportunities and innovative approaches to integrate highway noise reduction into its projects. Consequently, the guiding principles from this initiative will be applied in the design and construction phases of *I-95 Innovative Active Traffic Management* wherever and however applicable and possible.

Partnership

This TIGER IX application proposes infrastructure improvements that support and coordinate with economic development plans in the region. The project demonstrates strong disciplinary integration, symbiotically achieving development, economic, community, and environmental revitalization goals. Specifically, MDOT SHA will deliver on its commitment to operate a safe, well-maintained, reliable highway system that enables mobility choices for all customers and supports Maryland's communities, economy, and environment. Additional information about MDOT SHA, as well as the myriad stakeholders and supporters, is presented in **Section III. Project Parties.**

Over the past decade, MDOT SHA has coordinated with State agencies and local jurisdictions to develop solutions that improve the safe and efficient operation of traffic in this corridor. The *I-95 Innovative Active Traffic Management* project has a large and diverse group of stakeholders, many of whom bring critical information and input to the planning and

implementation process. The Governor has joined elected representatives and regional organizations in broadly supporting this project.

Letters of support are included in **Appendix B** and demonstrate the breadth of stakeholder support and partnership for this important project. The following elected officials, organizations, and businesses have joined the Governor to support this important project:

- Senators Cardin and Van Hollen
- House Representatives Brown, Cummings, Delaney, Raskin, Ruppersberger, and Sarbanes
- MDOT Secretary Rahn
- State Senate Chair Guzzone
- State House Chair Ebersole
- Howard County Executive Kittelman
- The Maryland Transportation Commission
- Baltimore Regional Transportation Board
- The I-95 Corridor Coalition
- Local businesses

VI. PROJECT READINESS

With a TIGER IX grant in place, the *I-95 Innovative Active Traffic Management* project is poised to implement crucial congestion remediation and increase travel time reliability and safety in a vital economic corridor. Further, this project will serve as the cornerstone of MDOT SHA's implementation plan for PTSU applications throughout the state. MDOT SHA has the technical and financial capacity to undertake this project quickly and meet all milestones.

Financial Feasibility



MDOT is responsible for building, operating, and maintaining a safe and seamless transportation network that



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links Maryland with the rest of the country and the world. MDOT directs and oversees the planning, construction, and operation of Maryland's highways, transit, maritime, rail, and aviation facilities, as well as the Maryland Motor Vehicle Administration. The TBUs are funded by a common funding source, Maryland's Transportation Trust Fund.

The Transportation Trust Fund is separate from the State's general fund and its revenues are dedicated to improving and operating Maryland's transportation network. The five TBUs and the Maryland Transportation Authority all work together to assist each other in the development of a seamless transportation system designed to fuel Maryland's economy and enhance its citizens' quality of life.

The Maryland Department of Transportation has developed a \$14.7 billion 6-year program. The MDOT FY 2018 to 2023 6-year consolidated transportation program (CTP) dedicates over \$8 billion to MDOT SHA's capital program, with approximately \$5 billion committed to

safety, congestion relief, and community enhancements.^{vii} Despite this significant investment, the transportation needs around the State continue to outpace the available resources. The TIGER IX funding requested would allow MDOT SHA to accelerate this project and continue the momentum from planning to design and construction.

As USDOT is aware, states receive a fixed amount of federal highway funds based on several factors and have discretion as to how this funding is allocated. Maryland generally prefers to allocate this funding on as few projects as possible to minimize the approval, oversight, and payment processes required of federally funded projects. Most project elements require a minimum 20-percent local match. This 80/20 split is not representative of the total state contribution to Maryland's Highway system, however. In FY 17, for example, Maryland contributed \$876 million, or 66 percent, of total spending of \$1.3 billion expended while the federal government contributed \$442 million, or 34 percent.

In demonstration of the importance of this project to the economic competitiveness of the state and the region and safety of its residents, MDOT SHA is directing **\$11.5 million** in state funds toward the overall cost of the project (**Table 3**). The State is requesting **\$11.5 million** in TIGER IX funds, which represents 50 percent of total project costs, to fill the gap between the available state funding and the project budget. These important funds will facilitate the operations improvements critical to congestion relief, reliable travel, and safe movement through this vital corridor.

Technical Feasibility

MDOT SHA will carry out the project elements proposed in this application, working in close coordination with local and regional planning and development entities to support the state and region's economic competitiveness and improve safety and quality of life.

With its extensive history analyzing this corridor, MDOT SHA is well positioned to efficiently implement

the proposed project. Supporters and stakeholders are discussed under the Partnership Selection Criteria discussion.

MDOT SHA has conducted numerous technical and concept studies that examine the challenges and alternatives and benefits within the I-95 corridor in Maryland. **These careful engineering, design studies, and activities ensure that this TIGER IX project is technically feasible.** As previously discussed under Project History, this corridor has been studied multiple times over the past decade, with the *I-95 Active Traffic Management Feasibility Study* analyzing the viability of short to mid-term solutions to address safety and operational issues along the corridor.

The 2017 Summary Report (included in Supplemental Materials) analyzes a subset of the feasibility study, focusing on the portions of the project and previous analysis that MDOT SHA plans to advance into design. **MDOT SHA has collected data and analyzed existing conditions, traffic operations, and traffic safety to develop design criteria and the basis**



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of this project's design. All project elements were identified based upon the primary goals of reducing the total number and severity of crashes, reducing overall vehicle-hours of delay and improving reliability, constructability, and financial feasibility. Further, MDOT SHA has already identified preliminary design considerations and environmental assessment from those concepts.

MDOT SHA has an excellent history of risk management across decades of project and construction experience. **The applicant has assessed project scope, schedule, and budget risks and mitigation measures and strategies.** Risks to the project have been analyzed. MDOT SHA is developing a toolbox of methodologies to innovatively mitigate the impacts to local area from noise and stormwater management. These includes changes in pavement and noise wall design as well as new methods for mitigation.

MDOT SHA plans, designs, constructs and maintains the State Highway System in Maryland. The State Highway System totals more than

5,200 miles or 17,000 lane-miles of roadway and more than 2,500 bridges and consists of the Interstate, Primary and Secondary Highways.^{viii} Many of these projects have included road rehabilitation and replacement projects similar to or greater than the size and scope of this project.

MDOT SHA has contractual mechanisms in place that will allow it to move quickly upon award to begin design, engineering, and construction of the project elements. MDOT SHA understands the need for projects to be obligated by September 20th, 2020 and expended by September 30th, 2025 to comply with TIGER IX grant funding requirements.

MDOT SHA is committed to advancing the *I-95 Innovative Active Traffic Management* project as quickly as possible and exploring all project delivery mechanisms to ensure the project meets prescribed implementation deadlines and delivers the goals of the project most efficiently. MDOT SHA has extensive experience executing projects of similar scope, as well as using alternative delivery methods such as design-build, as outlined under the Innovation selection criteria discussion.

Project Schedule

All necessary activities will be complete to allow TIGER funds to be

obligated sufficiently in advance of the deadlines. *I-95 Innovative Active Traffic Management* is prepared to complete all preconstruction activities by 2019, obligate funds by September 30th, 2020, and expend funding by September 30, 2021. **Table 4** presents the project schedule.

Environmental review and approval requirements, including National Environmental Policy Act (NEPA), are fully funded and have been accounted for in the schedule, along with procurement, design, and construction durations. **The project can begin construction quickly upon obligation of TIGER IX funds, and grant funds will be expended**

Table 4. Project Schedule Milestones

Project Schedule		
Milestone	Start Date	End Date
Right-of-Way Acquisition	N/A – No ROW acquisition necessary	
Programmed in STIP	February 2018	May 2018
Preliminary Engineering Complete	Late Spring 2018	May 2018
Design and Permitting	May 2018	February 2020
NEPA – Categorical Exclusion	Summer 2018	Summer 2019
Approval of Plan, Specification, and Estimate (PS&E)	February 2020	May 2020
Procurement	May 2020	August 2020
Construction	Spring 2020	Spring 2021
Project Completion	Spring 2021	



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expeditiously once construction starts.

No real property or ROW acquisition is necessary for the project. The construction program is straightforward; any significant geotechnical, environmental, public utility conflict, or site access issues can be resolved by established conventional practices.

Required Project Approvals

I-95 Innovative Active Traffic Management will obtain the required approvals in a timely manner to ensure that the project proceeds on schedule. This project is aligned with local, state, and regional priorities and plans, and supports the economic development initiatives central to Maryland's continued competitiveness. Specifically, the improvements proposed in this application align with state and local master plans and priorities.

The Maryland Strategic Goods Movement Plan, updated in 2015, identifies Maryland's multimodal transportation system for goods

movement as providing a critical support structure for the economic vitality of the State and surrounding region, as the volume of goods moving into, out of, and through Maryland continues to grow.^{ix} Consequently, it is critically important that Maryland's transportation agencies are well-equipped to understand current goods movement patterns, monitor trends and projections, be flexible to respond swiftly, and anticipate future needs. This Strategic Goods Movement Plan (included in Supplemental Materials) examines existing conditions and long-range projections, and recommends policy positions and strategies for MDOT and freight stakeholders to advance over the next five years. The proposed project aligns

with the goals and priorities of this statewide plan.

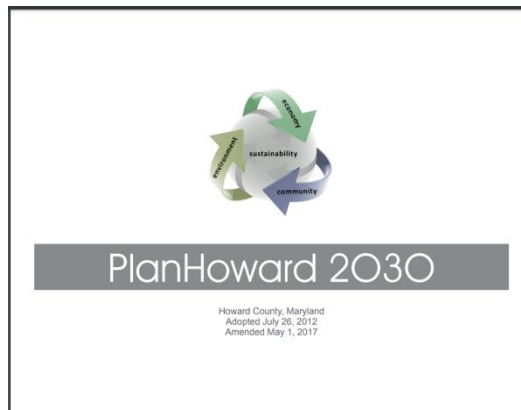
Howard County's *PlanHoward 2030* updates the County's General Plan to guide decisions related to development, land preservation, changing demographics and employment trends, neighborhood sustainability, and capital projects (included in Supplemental Materials).^x This plan highlights an objective to "enhance transportation connections between the County's economic activity areas," as well as "reduce traffic congestion on existing roadways such as MD 32...and I-95."

As discussed under Project Overview, Columbia is on a strong trajectory of growth and economic development. The Downtown Columbia Plan cites a shift in development to areas closer to I-95 and the need to support economic development with the necessary infrastructure to ensure residents and visitors can move between home, jobs, and amenities safely and efficiently (included in Supplemental Materials). Visions for the innovation district proposed for the Columbia Gateway

development are further defined in a 2016 University of Maryland Planning Studio report, which identifies highway access as one of the drivers for site selection for investors (included in Supplemental Materials).

In addition to the previously discussed major development planned for Columbia Gateway, the Howard County Council approved a \$90 million public financial deal for Columbia's master developer to overhaul the county's core in 2016. This major development prepares downtown Columbia for nearly 13 million square feet of new commercial, residential, and retail space.

While the project is in Howard County, MD 32 and MD 175 provide direct connections into Anne Arundel County. Consequently, the master plans and objectives for the county also inform the degree to which the proposed project supports the greater area's development. To this end, the Anne Arundel County Transportation Commission's objective to implement "local roadway and regional highway interchange improvements to





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increase safety, improve flow and reduce congestion,” as defined in their *General Development Plan – Transportation Plan* (included in Supplemental Materials).

Environmental Approvals

The NEPA process for this project is expected to involve preparation of a Categorical Exclusion (CE), with FHWA serving as the lead agency. The current schedule assumes issuance of the CE in Summer 2019. The NEPA process will include appropriate coordination with Federal and State permitting agencies.

As part of the planning process, an environmental inventory was done for the project area. On September 21st 2017, MDOT SHA introduced the I-95 project to FHWA’s (Maryland office) Project Delivery and Environmental Team, which included a brief overview of potential environmental impacts and project scope. As the project advances and a specific design decided, MDOT SHA will reach out to the public and ensure that not only the immediate community is aware of our efforts in

the corridor, but also other potential users of I-95. Their input will be crucial to this project’s success.

Typical site development permits will be required as project designs are finalized, including Maryland Department of the Environment stormwater management and erosion/sediment control plan approvals. Based on the resources identified within the I-95 concepts

Figure 9. Potential Required Permits

- **USACE – Section 404 Clean Water Act Permit**
- **Maryland Department of the Environment**
- **Section 401 Clean Water Act – Water Quality Certification**
- **Nontidal Wetland and Waterways Permit**
- **Waterway Construction Permit**
- **Erosion and Sediment Control Approval**
- **Stormwater Management Approval**
- **Maryland DNR Roadside Tree Permit**
- **Maryland Reforestation Law Approval**
- **National Pollutant Discharge Elimination System (NPDES) Notices of Intent**

and feasibility studies, permits in **Figure 9** may be required. **Mitigation will be provided in accordance with all applicable environmental requirements.**

It will be crucial to ensure the traveling public on I-95 can provide input to this project. As such, MDOT SHA will not only have to follow more traditional outreach methods, in the form of mailers to the local communities, but also users from outside the study area. MDOT SHA will look for innovative ways to reach these users and to receive their comments when we can present the public with a reasonable design.

State and Local Approvals

State and local approvals on which the project depends demonstrate the project is broadly supported. As demonstrated in its support letter, the Baltimore Regional Transportation Board (BRTB), which is the Metropolitan Planning Organization for the region, has fully supportive of the project. BRTB has committed to adding all funds awarded under this competitive discretionary grant

program to the Transportation Improvement Program (TIP) immediately upon award. It is the standing practice of the organization to add grant-funded projects to the TIP once funds become available.

State and local planning are key to ensuring critical projects are prioritized for State and local funding. In Maryland, the transportation plan sets the vision for addressing the transportation needs of the future and lays the groundwork for successive plans that recommend fiscally-constrained projects for the state transportation improvement program (STIP), as shown in **Figure 10.**^{xi}

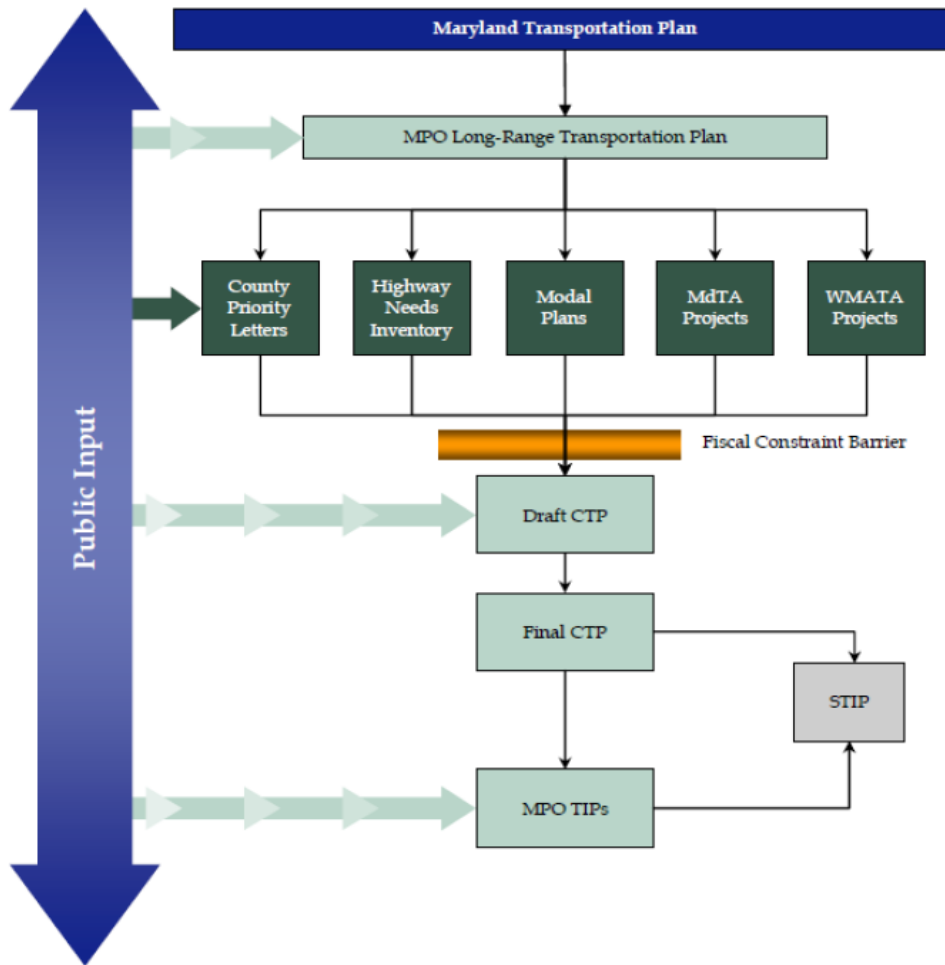
Federal Transportation Requirements Affecting State and Local Planning

The updated Maryland State Freight Plan is nearing completion. The *I-95 Innovative Active Traffic Management* project will be included in this revision. As previously discussed, the project will be added to the STIP and TIP within a matter of days following announcement of a TIGER IX award. Paperwork for this addition would be



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Figure 10. State and Local Transportation Planning Process



completed simultaneously to expedite approval by the BRTB. Following this approval, MDOT SHA will work expediently to secure FHWA approval.

Assessment of Project Risks and Mitigation Strategies

MDOT SHA will use its vast experience with both capital construction projects as well as

federal grants to assess all project risks and implement mitigation strategies. MDOT and MDOT SHA has a demonstrated record of efficient, responsible TIGER fund expenditure. Most recently in 2014, the agency received a \$10 million TIGER grant to enable a highway widening project on MD 175 from Disney Road to Reece Road. The project has adhered to its proposed schedule and budget, with construction advertisement in June 2016, Notice to Proceed granted in November 2016. The project is at 17 percent construction completion to date, with an estimated opening date of December 2019.

Upon approval of this TIGER IX discretionary grant application, MDOT will allocate the funding necessary to cover the balance of the project to ensure 100 percent funding for project construction. MDOT will update the CTP to budget the funds to meet the project schedule. BRTB has also committed to adding the funds from the TIGER IX grant immediately to the regional transportation improvement program (as discussed previously), should *I-95 Innovative*

Active Traffic Management be awarded the discretionary grant.

While SHA anticipates allocation of the full funding for the project's matching costs, there could be a funding shortfall due to austerity measures at the State, local, or federal level. SHA would adjust its capital budget to ensure sufficient funding is available to complete the project within the calendar parameters of the TIGER IX grant so that the grant funds would not be lost.

Delays to the review of permitting applications or final designs, as well as increased costs of construction material, are just some of the risks that could adversely affect the project schedule. MDOT SHA closely coordinates with permitting agencies to ensure submissions are being reviewed promptly. If necessary, review delays would be escalated to highest level at MDOT SHA—to the Administrator—to address with counterparts at review agencies. Cost increases are addressed through the 35 percent contingency built into the project budget.



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Additional risks such as unforeseen weather-related delays could create delays. MDOT SHA plans to mitigate this risks by including completion calendar dates and incentives for on-time or early completion in construction contracts, as well as disincentive clause for not meeting project schedules. This is a straightforward project with no structures, and therefore MDOT SHA does not anticipate unforeseen delays.

MDOT SHA has assessed risks appropriate to the currently level of design, such as environmental resources. The engineering work has not yet determined the precise impacts to resources. However, the purpose of using the existing roadway is to minimize environmental impacts and current estimates show no significant impacts. Furthermore, MDOT SHA's design will apply the latest technologies and methods to limit any potential impacts.

Right-of-way is a major component to many road projects and the risks associated with it cannot be understated. However, much like the

environmental impacts, the projects goal is to remain within MDOT SHA's right-of-way. This is both reasonable and achievable given the existing State-owned right-of-way along the I-95 roadway.

MDOT SHA is aware and prepared for the legislative process necessary to ensure compliance with Maryland laws. The current laws in Maryland do not allow MDOT SHA to enforce traffic regulations; such is the case in turning on/off lanes as part of PTSU. The planning team has brought this issue up over the past year to the operating agency, CHART, and efforts are already underway to procure the proper authorization to allow for operations.

Lastly, it is important to note that MDOT SHA approaches this projects as an iterative process of improvement. Efforts are underway to not only assess risks, but to also find the latest mitigation technologies and methods to address any potential issues. For example, noise impact mitigation is an area MDOT SHA is excited to improve upon and has a program in place to research all

potential solutions, including new noise wall materials, existing topography, and other innovative approaches.

The goal of *I-95 Innovative Active Traffic Management* is not to implement these improvements at *any* cost, but rather to avoid and mitigate for impacts and deliver a project to improve operations and safety at a *reasonable* cost.

VII. BENEFIT COST ANALYSIS

A benefit-cost analysis (BCA) was conducted for the *I-95 Innovative Traffic Management* project for submission to the USDOT as a requirement of a discretionary grant application for the TIGER 2017 program. The analysis was conducted in accordance with the benefit-cost methodology as outlined by U.S. DOT in the 2017 TIGER Benefit-Cost Analysis Guidance. The period of analysis corresponds to 22 years and includes two years of construction and 20 years of benefits after operations begin in 2022.

This TIGER project allows MDOT SHA to innovatively provide congestion relief and safety improvements on I-95 between MD 32 and MD 100. Improvements include PTSU during peak periods to create outside auxiliary lanes in both directions, interchange ramp improvements, and dynamic signing. Under current conditions, capacity limitations and highway design are resulting in major congestion and safety concerns. The project will innovatively address these issues through a coordinated package of infrastructure improvements will facilitate safer vehicle movements through this high-traffic corridor.

For the analysis period, the total benefits are \$465.7M in undiscounted \$2016, \$132.9M if discounted at 7 percent, \$265.6M if discounted at 3 percent. Total costs are \$24M in undiscounted \$2016, \$17.5M if discounted at 7 percent, \$20.9M if discounted at 3 percent.

Using a 7 percent discount rate, the project NPV is \$115M with a benefit-cost ratio of 7.57. Using a 3 percent discount rate, the project NPV is



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\$244.7M with a benefit-cost ratio of 12.73. The benefit-cost ratios are high, which is because this project has the potential to bring significant congestion relief in the project area with relatively low construction costs due to the use of existing lanes. **Table 5** summarizes the BCA results.

A detailed discussion of the quantitative benefits and costs associated with the project is presented in **Appendix A**.

VIII. COST SHARE

The *I-95 Innovative Active Traffic Management* funding share from MDOT SHA are stable and dependable, as explained above in **Section IV. Grant Funds, Sources, and Uses of Project Funds**. The project parties have the resources and commitment to construct, maintain, and operate the infrastructure funded under this project. The State of Maryland is committed to maintaining its record of prudent fiscal management while supporting and promoting Maryland's continued economic growth. Consequently, this TIGER IX funding package submitted under *I-95 Innovative Active Traffic*

Table 5. Benefit Cost Analysis Results, Millions of 2016 Dollars

BCA Metric	Project Lifecycle		
	Undiscounted	Discounted (7%)	Discounted (3%)
Total Benefits	\$465,693,980	\$132,896,669	\$265,557,741
Total Costs	\$23,960,000	\$17,549,054	\$20,860,249
Net Present Value (NPV)	\$441,733,980	\$115,347,615	\$244,697,492
Benefit Cost Ratio (BCR)	19.44	7.57	12.73

Management balances MDOT SHA's fiscal constraints with its commitment to funding this critical project or local, regional, and national significance.

preserve and enhance the economic strength and competitiveness of the nation, State of Maryland, and the region.

The *I-95 Innovative Active Traffic Management* project cannot be completed without a TIGER Discretionary Grant. The proposed grant funding package is outside the scope of existing federal formula and other funds for the State of Maryland and MDOT SHA, which has allocated all that it can now.

The funding package will unlock a magnitude of positive safety, economic competitiveness, and quality of life impacts. By supporting and advancing the myriad development and employment opportunities in the area, TIGER IX funds will facilitate a project that will



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IX. FEDERAL WAGE RATE CERTIFICATION



MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

Larry Hogan
Governor

Boyd K. Rutherford
Lt. Governor

Pete K. Rahn
Secretary

Gregory Slater
Administrator

October 5, 2017

CERTIFICATE OF COMPLIANCE WITH FEDERAL WAGE RATE REQUIREMENTS

This certificate states that the Maryland State Highway Administration (SHA) will comply with the requirements of subchapter IV of chapter 31 of title 40, United States Code (Federal wage rate requirements), as required by the FY 2017 Appropriations Act for the *I-95 Innovative Active Traffic Management* project.



Steven Marciszewski
Director, Office of Construction
Maryland State Highway Administration

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ⁱ https://ops.fhwa.dot.gov/freight/infrastructure/ismt/state_maps/states/maryland.htm

ⁱⁱ <http://msa.maryland.gov/msa/mdmanual/01glance/html/pop.html>

ⁱⁱⁱ <http://www.mdot.maryland.gov/newMDOT/Freight/Documents/Strategic%20Goods%20Movement%20Plan.pdf>

^{iv} MDOT SHA, I-95 Baseline Conditions Report – Collision Summaries

^v <http://commerce.maryland.gov/Documents/ResearchDocument/MarylandMilitaryInstallationEconomicImpactStudy2015.pdf>

^{vi} Maryland Department of Planning and Zoning. Gateway Growth Projections, July 7, 2017.

^{vii} http://www.mdot.maryland.gov/newMDOT/Planning/CTP/CTP_18_23_Draft/Index_Draft.html

^{viii} <http://statewideplanning.org/states/maryland-2/>

^{ix} <http://www.mdot.maryland.gov/newMDOT/Freight/Documents/Strategic%20Goods%20Movement%20Plan.pdf>

^x <https://www.howardcountymd.gov/Departments/Planning-and-Zoning/Community-Planning/General-Plan>

^{xi} http://www.mdot.maryland.gov/Office_of_Planning_and_Capital_Programming/STIPandTIP/2013_STIP_Index/Figure_4_1.pdf

All documents and supplemental materials associated with the *I-95 Innovative Active Traffic Management* TIGER IX application can be found on the Maryland Department of Transportation website at the following web address:

www.mdot.maryland.gov/tiger